YORK®	ROOFLINK™ BUILDING AUTOMATION SYSTEM INTERFACE FOR THE ECO2 PACKAGED ROOFTOP	
TECHNICAL DATA	Initial Release	Form 100.50-TD4 (503)

INTRODUCTION

For installations that require communication between an existing building automation system and an eco² packaged rooftop that are not capable of communicating via the optional BACnet or LON protocols, YORK offers a third method of interfacing that provides hard-wired communication with the RoofLink™.

This type of connection and control is typically used in one or more of the following situations:

- The existing BAS does not have BACnet or LON connectivity
- The HVAC system operation does not require the level of monitoring or control provided by a BACnet or LON connection
- A panel interface (lights and switches) is adequate for the level of remote connection desired
- The fire safety system requires the ability to change smoke evacuation modes from a remote panel not capable of, or permitted to, communicating via BACnet or LON.

The RoofLink BAS interface provides the binary and analog inputs and outputs shown in Table 1. In this Table there are two columns, one for VAV applications and one for constant volume applications. The actual control terminal points have different functions depending on the OptiLogic unit controller configuration.

Table 1: RoofLink I/O Map for Constant and Variable-Air-Volume

I/O No.	I/O Type No.	I/O Name	Analog or Binary	I/O Type	Signal Level	Connection Type
49	1[1]	CV: Occupied Cooling Setpoint VAV/Flexsys: Supply Air Temp. Reset	AI	Voltage	0-10V	.25 M SPADE
50	2	CV: Occupied Heating Setpoint VAV/Flexsys: Duct Static Press. Reset	AI	Voltage	0-10V	.25 M SPADE
51	3	Demand Limiting	AI	Voltage	0-10V	.25 M SPADE
52	4	Ventilation Override	AI	Voltage	0-10V	.25 M SPADE
53	5	Building Pressure SP	AI	Voltage	0-10V	.25 M SPADE
54	6	Not Used	AI	Voltage	0-10V	.25 M SPADE
55	1	Economizer Enable	BI	24 VAC		.25 M SPADE
56	2	Morning Warm Up	BI	24 VAC		.25 M SPADE
57	3	Smoke Purge Mode [2]	BI	24 VAC		.25 M SPADE
58	4	Smoke Purge Mode	BI	24 VAC		.25 M SPADE
59	5	Smoke Purge Mode	BI	24 VAC		.25 M SPADE
60	6	Not Used	BI	24 VAC		.25 M SPADE
61	1	Supply Air Temperature	AO	analog	0-10V	.25 M SPADE
62	2	Cooling/Heating Output	AO	analog	0-10V	.25 M SPADE
63	3	Ventilation Output	AO	analog	0-10V	.25 M SPADE
64	4	Not Used	AO	analog	0-10V	.25 M SPADE
65	1	Supply Fan Faults	BO	relay		.25 M SPADE
66	2	Dirty Filter Faults	BO	relay		.25 M SPADE
67	3	Cooling/Heating System Faults	BO	relay		.25 M SPADE
68	4	Sensor Faults	BO	relay		.25 M SPADE

The RoofLink interface may be installed remote from the rooftop unit so that it can be easily wired to the site control interface hardware. With proper protection, outdoor installation is possible, however it is recommended that the RoofLink be installed indoors with the site control interface hardware. This is for two reasons, one, to reduce wiring between the RoofLink and the control interface due to distance, and easy verification of control wiring accuracy. The RoofLink interface connects back to the OptiLogic panel via a twisted pair shielded cable, which minimizes the amount and size of the wire bundle that might have to go great distances. The typical configuration for the RoofLink interface is shown in Figure 1 below.

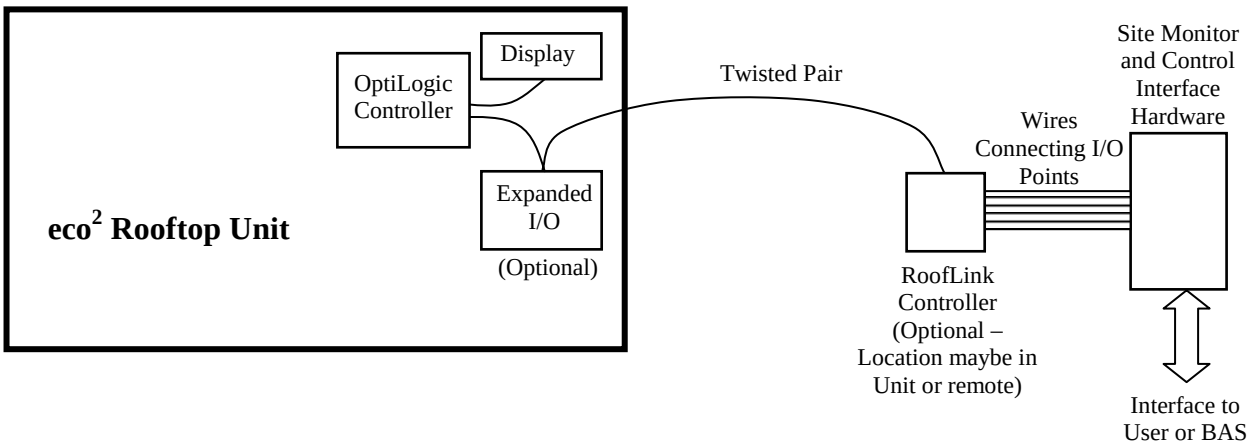


Figure 1: Typical Arrangement for RoofLink System Interface

Sequence of Operation, ROOF-LINK Interface Controller

The ROOF-LINK Interface controller shall be used as an Input/Output expansion device to the OptiLogic Controller (MOD-DCU). All Analog Inputs, Analog Outputs, Binary Inputs, and Binary Outputs of the ROOF-LINK Interface controller shall be accessible to the OptiLogic Controller. All Inputs and outputs shall be fixed to the range and/or type as indicated in *Table 1: Input and Output Map*.

Upon power up, the ROOF-LINK Interface Controller shall operate and establish communication with the OptiLogic Controller. If communication is established, the ROOF-LINK Interface will simply remain idle and wait for instructions from the OptiLogic Controller. All Analog and Binary Outputs of the ROOF-LINK Interface shall be commanded to operate by the OptiLogic Controller. If communication is not established or lost, all Binary Outputs shall be set to high (ON). This may be used as an indicator to the third party BAS, hardwired to the ROOF-LINK Interface, that communications to the YPAL unit is lost or not established.

Sequence of Operation, OptiLogic Controller

Upon power up, the OptiLogic Controller will attempt to establish communications with the ROOF-LINK Interface Controller. If communications cannot be established or are lost, the YPAL unit shall operate using the last known values.

If communications can be established between the OptiLogic Controller and the ROOF-LINK Interface controller, the OptiLogic Controller shall operate as described below:

YPAL Response To ROOF-LINK Inputs

Analog Inputs:

Each Analog Input of the Roof-Link Interface shall be reserved for a specific YPAL control setpoint/variable as detailed in *Table 2: OptiLogic Controller to ROOF-LINK AI Relation*. It is intended that the customer or other third party will hardwire to these inputs and command them as required by the existing third party control system. Since the control requirements from one application to another can vary, the inputs may or may not be used. To compensate for this, each input of the Roof-Link Interface will be scanned by the OptiLogic Controller and checked for proper range. Each input must be greater than or equal to 2 volts and less than or equal to 10 volts. All readings less than 2 volts shall be deemed unreliable and all readings greater than 10 volts shall be interpreted as 10 volts.

If an input is not wired to, the Analog Voltage at that input will be zero and the reading shall be determined unreliable. Each input that is deemed unreliable will result in no control action by the YPAL Unit Controller other than what is indicated in the YPAL Controller specification. However, each input that is deemed reliable shall require the YPAL Unit Controller to override the standard control variable or mode (what is in the YPAL Unit Controller specification) with an active setpoint that corresponds to the voltage at the Analog Inputs of the ROOF-LINK Interface. Figure 1 details the linear relationship between the Active Control Setpoint/Variable relative to the Analog Input Voltage read at the ROOF-LINK Interface.

Table 2: OptiLogic Controller to ROOF-LINK AI Relation

Roof-Link Analog Inputs	***YPAL Control Variable***	***Active Value at 2V***	***Active Value at 10V***	***Active Value at 0-2V***
AI1 (Unit Type = CV)	Occupied Cooling Setpoint	Occupied Cooling Setpoint Entered at the KEYPAD	Occupied Cooling Setpoint Entered at the KEYPAD + 8°F	Occupied Cooling Setpoint Entered at the KEYPAD
AI2 (Unit Type = CV)	Occupied Heating Setpoint	Occupied Heating Setpoint Entered at the KEYPAD	Occupied Heating Setpoint Entered at the KEYPAD – 8°F	Occupied Heating Setpoint Entered at the KEYPAD
AI1 (Unit Type = VAV or Flexsys)	Supply Air Temperature Setpoint	VAV Low Temperature Setpoint For Cooling	VAV High Temperature Setpoint For Cooling	VAV Low Temperature Setpoint For Cooling
AI2 (Unit Type = VAV or Flexsys)	Duct Static Pressure Setpoint	Duct Static Pressure Entered at the KEYPAD *minus* 50%	Duct Static Pressure Entered at the KEYPAD *plus* 50%	Duct Static Pressure Entered at the KEYPAD
AI3 (All Units)	Smoke Purge Mode	See Text		
AI4 (All Units)	Demand Ventilation Multiplier	1.0 (See Text)	Max. Demand Ventilation Multiplier Entered at the KEYPAD.	See Text
AI5 (All Units)	Building Pressure Setpoint	-0.20”	+0.20”	Building Pressure Setpoint Entered at the KEYPAD

Figure 1: Active Control Setpoint/Variable vs. AI Voltage

AI #3 Smoke Purge Mode

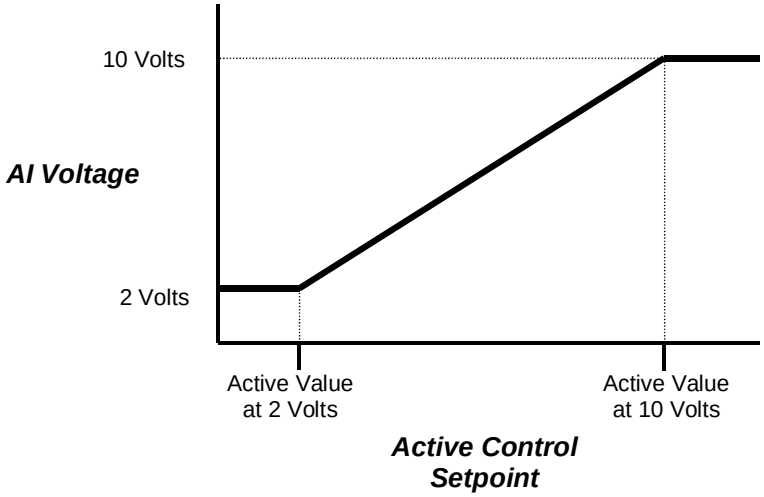
Smoke Purge Mode operation shall be as described in the YPAL Controller Specification when AI3 of the Roof-Link Interface is deemed unreliable (indicates 2 Volts or less). This means that the Smoke Purge Mode that the YPAL unit will initiate after the BI for smoke purge is driven high will be as entered at the KEYPAD. If AI3 of the Roof-Link Interface indicates a reliable voltage, the Smoke Purge Mode that will be initiated by the YPAL controller will be as indicated in *Table 3: Relation Between Smoke Purge Mode and AI3 Voltage*.

Table 3: Relation Between Smoke Purge Mode and AI3 Voltage

Active Smoke Purge Mode	***AI3 Voltage***	***Voltage Tolerance***
Mode 1	3.5V	3.0~4.0V
Mode 2	5.0V	4.5~5.5V
Mode 3	6.5V	6.0~7.0V
Mode 4	8.0V	7.5~8.5V
Mode 5	9.5V	9.0~10.0V

Note, it is intended that the YPAL Unit Controller be able to switch between modes during Smoke Purge Operation. To avoid problems, the YPAL Unit Controller shall qualify the AI Voltage for 30 seconds after a change in voltage is indicated.

AI #4 Ventilation Override



If AI4 is reliable, the YPAL Control variable Demand Ventilation Multiplier will be overridden to the value corresponding to the voltage read. This Demand Ventilation Multiplier shall be overridden even if the IAQ sensor is not present. If the IAQ sensor is present, the Demand Ventilation Multiplier required by the ROOF-LINK Interface shall be "OR"ed with the Demand Ventilation Multiplier calculated by the OptiLogic Controller. In other words, the Demand Ventilation Multiplier used by the OptiLogic Controller shall be the Demand Ventilation Multiplier calculated by the OptiLogic Controller OR AI #4 of the ROOF-LINK Interface, whichever is greater.

Binary Inputs

The Binary Inputs of the ROOF-LINK Interface shall be monitored by the OptiLogic Controller for status. When a binary input changes state, the OptiLogic Controller will qualify the input for 10 seconds.

BI #1 Economizer Allowed

If BI #1 shows active, the OptiLogic controller shall enable the Economizer (if present). Note, this economizer allowed input shall be "OR"ed with the Economizer suitable calculation in the OptiLogic Controller. In other words, Economizer shall be suitable if the YPAL Calculations for Economizer Suitable are satisfied OR BI #1 of the ROOF-LINK Interface is active. The OptiLogic Controller must have an Economizer Installed (Economizer Installed = YES) and the Economizer Enabled (Economizer Enabled = ON) for this to function.

BI #2 Initiate Morning Warm Up

If BI #2 shows active, the OptiLogic controller shall enter the Morning Warm Up mode of operation. This initiation of Morning Warm Up shall be "OR"ed with the optimal start initiation of Morning Warm Up. In other words, Morning Warm Up shall be initiated if the optimal start algorithm requires it OR BI #2 of the ROOF-LINK Interface is active. Note, the Morning Warm Up parameter must be set to ON for morning warm up to function.

BI #3 50% Demand Limiting

If BI #3 shows active, the OptiLogic controller shall inhibit 50% of the cooling or heating steps from operating. If more than 50% of the cooling or heating steps are already operating, the OptiLogic Controller will shut down steps one at a time until only 50% of the cooling or heating steps are operating (Minimum Run Times shall be maintained). The supply fan and economizer algorithms shall operate normally.

50% demand limiting shall end when BI #3 switches from ON to OFF.

BI #4 100% Demand Limiting

If BI #4 shows active, the OptiLogic controller shall inhibit 100% of the cooling or heating steps from operating. If any cooling or heating steps are already operating, the OptiLogic Controller will shut down these steps one at a time until none of the cooling or heating steps are operating (Minimum Run Times shall be maintained). The supply fan and economizer algorithms shall operate normally.

100% demand limiting shall end when BI#4 switches from ON to OFF.

YPAL Control of ROOF-LINK Outputs

The OptiLogic Controller will command and control the Analog and Binary Outputs of the Roof-Link Interface. The analog outputs will be controlled to reflect real-time operational data and the binary (relay) outputs will be controlled on/off to indicate active YPAL Unit alarms.

Analog Outputs

Analog Output 1 – Supply Air Temperature

Analog Output #1 of the Roof-Link Interface shall be controlled by the OptiLogic Controller to correspond to the Supply Air Temperature of the YPAL unit. This output will vary 0-10V and will linearly correspond to a supply air temperature of 0-150°F. The output will continuously be updated and shall not be affected by Unoccupied/Occupied modes of operation.

Analog Output 2 – Cooling/Heating Output

Analog Output #2 of the Roof-Link Interface shall be controlled by the OptiLogic Controller to correspond to the number of cooling or heating stages active (on) in the YPAL unit. Since this output is proportional, the relationship between output voltage and cooling or heating stages is indicated in *Table 4: AO #2 Output Voltage vs. YPAL Cooling/Heating Output*.

Table 4: AO #2 Output Voltage vs. YPAL Cooling/Heating Output

YPAL Cooling/Heating Output	***ROOF-LINK AO #2 Voltage***
Cooling Step #6	9.25V
Cooling Step #5	8.5V
Cooling Step #4	7.75V
Cooling Step #3	7.0V
Cooling Step #2	6.25V
Cooling Step $1	5.5V
No Cooling or Heating	5.0V
Heating Step #1 (0% For Proportional Heat)	4.5V
Heating Step #2	3.75V
Heating Step #3	3.0V
Heating Step #4	2.25V
Heating Step #5	1.5V
Heating Step #6 (100% For Proportional Heat)	0.75V

Analog Output 3 – Ventilation Output

Analog Output #3 of the Roof-Link Interface shall be controlled by the OptiLogic Controller to correspond to the Outside Air Damper position or Outside Air Flow Rate, depending on the type of ventilation system present in the YPAL unit.

When the YPAL unit is configured for no Airflow Measurement equipment (Airflow Measurement Config set to NONE) the YPAL unit shall command AO3 of the Roof-Link Interface to equal the YPAL output to the Economizer Damper. The 0-10V output shall correspond to 0-100% damper position.

When the YPAL unit is configured for Airflow Measurement equipment (Airflow Measurement Config set to Full, Minimum, or ¼ - ¾ the YPAL unit shall command AO3 of the Roof-Link Interface to correspond to the Outside Airflow through the unit. The 0-10V output shall correspond to 0 CFM to Maximum CFM potential. Maximum CFM potential shall equal the maximum flow that the particular AMS can measure. The Maximum CFM potential shall be calculated based AMS type, K-Factor(s), Area(s), and the maximum pressure drop measurable by the YPAL unit, which is 0.25" WC.

Analog Output 4 – Duct Pressure

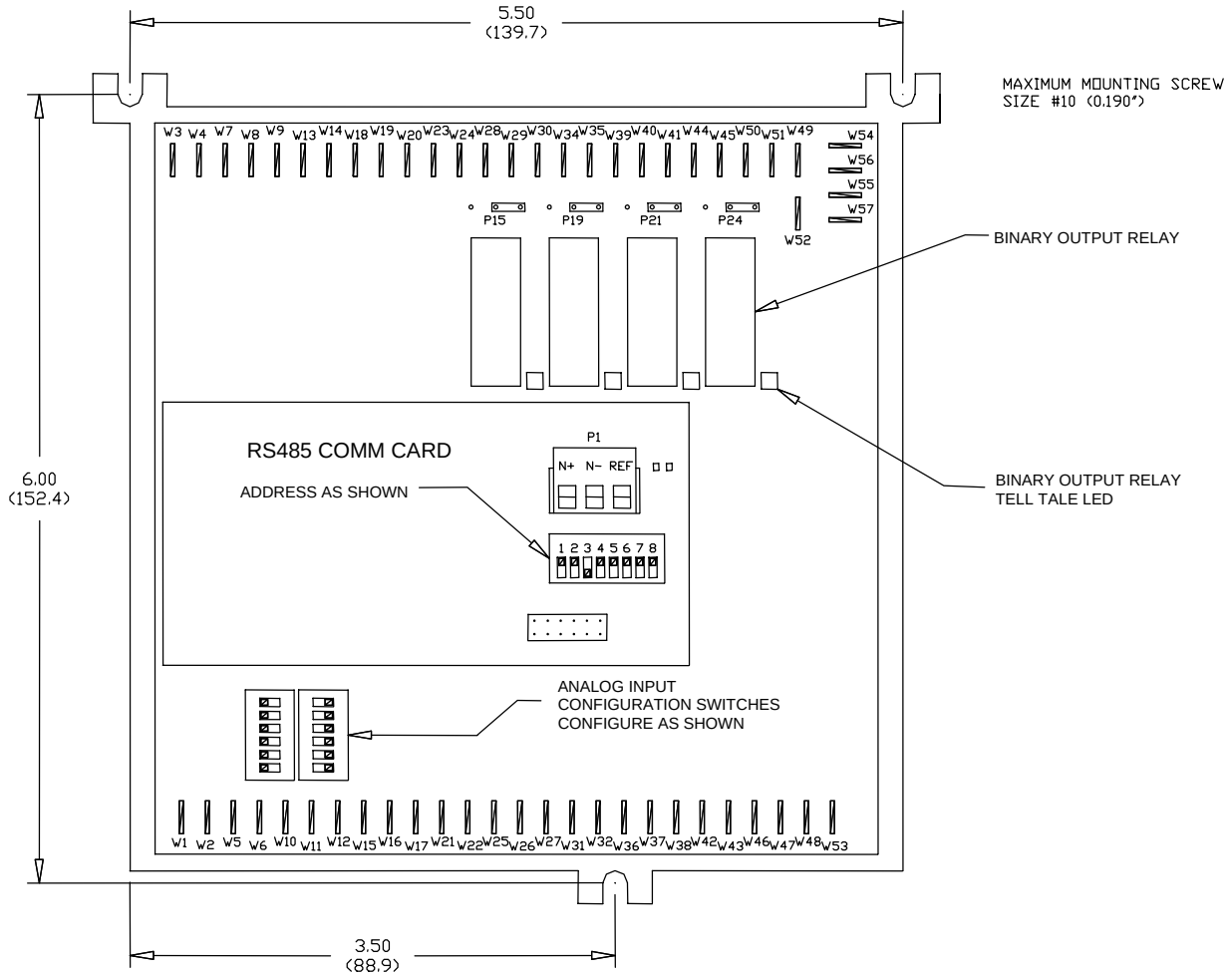
Analog Output #4 of the Roof-Link Interface shall be controlled by the OptiLogic Controller to correspond to the Duct Pressure of the YPAL unit. This output will vary 0-10V and will linearly correspond to a duct pressure of 0 – 5" W.C.

Binary Outputs

The Binary Outputs of the Roof-Link Interface shall be controlled by the OptiLogic Controller in response to active system alarms. Each Binary Output shall be assigned to a group of related alarms. When the OptiLogic Controller announces one these alarms, the corresponding Binary Output of the Roof-Link Interface shall be set to ON. Any Binary Output that is turned ON shall remain ON as long as the alarm is ACTIVE. When the alarm clears, the Binary Output shall be commanded OFF. *Table 5: Relation Between YPAL Alarms and ROOF-LINK BOs* details the relationship between YPAL alarms and the Binary Outputs.

Table 5: Relation Between YPAL Alarms and ROOF-LINK BOs

BO1 Supply Fan Faults	BO2 Dirty Filter Faults	BO3 Cooling/Heating System Faults	BO4 Sensor Faults
• Excess Duct Pressure Fault • Supply Fan Fault • Air Switch Fault	• Dirty Filter Fault (Unit) • Dirty Filter Fault (Flexsys Bypass)	• Compressor Safety Trip • Compressor Safety L/O 1 • Compressor Safety L/O 2 • COR Status Fault • High Pressure Unloading (1, 2, or 3) • Evap Freeze Fault • HW Freeze Fault	• All Sensor Faults detailed in the Fault Description Table, Table A.3.1 of the specification. (Faults 17 through 34)


5.50
(139.7)
MAXIMUM MOUNTING SCREW
SIZE #10 (0.190")
W3 W4 W7 W8 W9 W13 W14 W18 W19 W20 W23 W24 W28 W29 W30 W34 W35 W39 W40 W41 W44 W45 W50 W51 W49
W54
W56
W55
W57
P15
P19
P21
P24
W52
BINARY OUTPUT RELAY
RS485 COMM CARD
P1
N+ N- REF
ADDRESS AS SHOWN
1 2 3 4 5 6 7 8
BINARY OUTPUT RELAY
TELL TALE LED
ANALOG INPUT
CONFIGURATION SWITCHES
CONFIGURE AS SHOWN
W1 W2 W5 W6 W10 W11 W12 W15 W16 W17 W21 W22 W25 W26 W27 W31 W32 W36 W37 W38 W42 W43 W46 W47 W48 W53
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3.50
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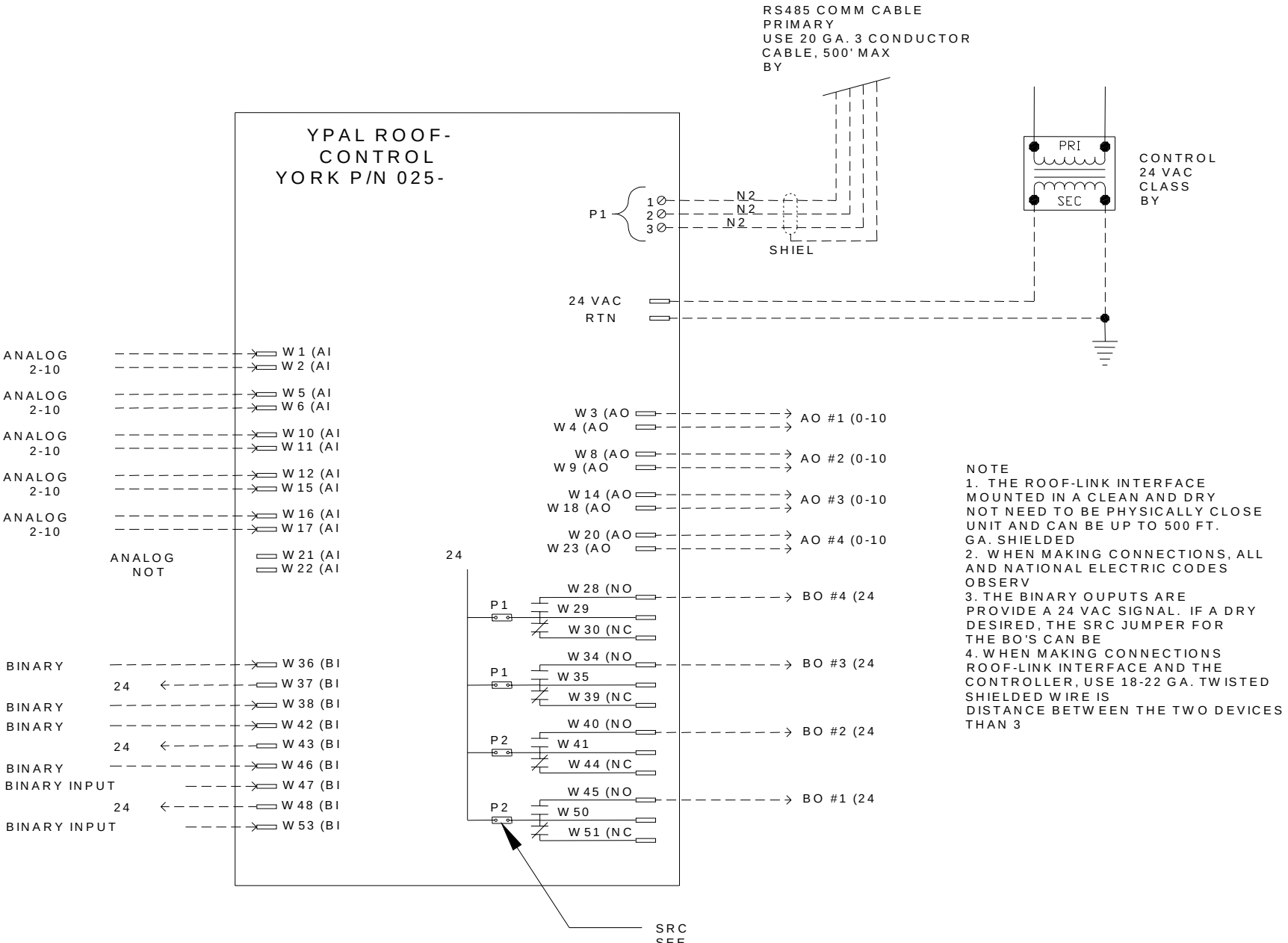
YORK ROOFLINK
FIELD CONNECTION



NOTE
1. THE ROOF-LINK INTERFACE
MOUNTED IN A CLEAN AND DRY
NOT NEED TO BE PHYSICALLY CLOSE
UNIT AND CAN BE UP TO 500 FT.
GA. SHIELDED
2. WHEN MAKING CONNECTIONS, ALL
AND NATIONAL ELECTRIC CODES
OBSERV
3. THE BINARY OUPUTS ARE
PROVIDE A 24 VAC SIGNAL. IF A DRY
DESIRED, THE SRC JUMPER FOR
THE BO'S CAN BE
4. WHEN MAKING CONNECTIONS
ROOF-LINK INTERFACE AND THE
CONTROLLER, USE 18-22 GA. TWISTED
SHIELDED WIRE IS
DISTANCE BETWEEN THE TWO DEVICES
THAN 3

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